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1958 - 1959 ANNUAL REPORT
PRIEST RIVER EXPERIMENTAL FOREST

By Robert W. Mutch
Superintendent

INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION
OGDEN, UTAH

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INTRODUCTION. The 6400-acre Priest River Experimental Forest, as stated in the Priest River guidebook, is dedicated to the development of better methods of management and protection of forested lands through research. This experimental forest is supervised by the Inland Empire Research Center, Spokane, Washington, and is maintained by the Intermountain Forest and Range Experiment Station, Ogden, Utah.

An experimental forest has many facets. The forested slopes provide suitable habitat for bear, deer, grouse, and other forms of wildlife. Residents of the surrounding countryside utilize the forest in their pursuit of game during the hunting season--a search for huckleberries in late July and August--or simply to enjoy a drive over one of the many forest roads. Although the experimental forest does offer beneficial side effects to the people of the neighboring community, its major contribution is as an invaluable outdoor laboratory where the research forester can "come to grips" with the many problems confronting every land manager. This outdoor laboratory provides demonstrational and educational opportunities as well--ecology and dendrology field trips by university students, 4-H girls and boys increasing their knowledge of plant life--and these instructional opportunities are made possible through the development of the experimental forest.

Forest fire research, forest management research, and forest influences are the primary fields of activity at the Priest River Experimental Forest, with attention also given to forest disease projects. The experimental forest provides a workshop where scientists from these research branches can glean some of the answers so necessary in developing a given unit of land to its highest productive capacity. Although each of these research divisions has independent problems, the successful management of our natural resources demands that the efforts of the various research units be closely integrated. The research foresters, to answer questions put to them by the land manager, must work together, pooling their knowledge and prescribing resource management methods based on a broad foundation of substantiated data. It is in this way that the wise management of resource values will be assured.

An example of this cooperation occurred this past summer on the Kaniksu National Forest. National forest personnel met with forest management and forest fire research men for a field trip and discussion of prescribed burning in the management of western white pine. Here was a case where forest administrators were desiring prescribed burning guidelines to assist them in the management of an important western timber species, and research personnel from two divisions were right there on the ground going over this problem with the land managers. This participation in resource problems by all interested groups is a healthy situation--healthy for forestry in general and directly beneficial to the forest resources. Many of the answers to the problems raised at discussions such as this can be obtained at places like Priest River where research facilities have been developed through the years.

Research activities at the Priest River Experimental Forest during 1959 were numerous and varied. Since the 1920's forest fire research has always carried out an active program at the experimental forest, and 1959 was no exception. Forest management and forest genetics research plots were remeasured. A new contour road was constructed, adding one more link to the extensive road network planned for the experimental forest. Pole blight research plots were maintained through the spring and summer. Merle Lloyd and his field assistant studied the role microclimate plays in the spread of blister rust. Accurate weather observations are of the utmost importance to all phases of research. The Priest River Experimental Forest has always been vitally concerned with the recording of weather factors that influence forest development. A reappraisal this past summer of the entire weather reporting picture at Priest River indicated the need for several changes. As a result of this reappraisal three records were discontinued and a storage rain gage was installed at the Benton Spring snow course.

A physical plant is required to house personnel and to provide the necessary installations and equipment for productive research work. This physical plant must be maintained in the best possible condition. As age catches up with the physical plant, more and more time is occupied with maintenance chores.

An experimental forest is more than a collection of buildings surrounded by forest research plots and projects. The human element which adds purpose and direction to the development of the forest must also be considered. Many individuals with many purposes visited the forest during 1959.

Since no annual report was prepared for 1958, the highlights of that year will be presented following the 1959 portion of this report.

RESEARCH ACTIVITIES ON THE PRIEST RIVER EXPERIMENTAL FOREST

As stated in the introduction, the most efficient development of new management and protection methods will be realized through the integrated efforts of research units. The various divisions are charged with individual responsibilities, but all have the common objective of increasing the productive capacity of a given unit of land. The following research projects were conducted at the experimental forest during the past year as a part of the overall research program aimed at improving forest land productivity.

FOREST MANAGEMENT RESEARCH. The 1919 thinning plots (plots 105-108) along lower Benton Creek were remeasured in August. According to the Priest River Guidebook, this stand was 60 years old in 1919 when it was thinned from below. At that time the stand had about 80 percent of normal basal area stocking. To contrast the effect of thinning intensities, plots 106, 107, and 108 were thinned to 65, 50, and 38 percent of normal basal area stocking, respectively. Plot 105 was not thinned. The best growth has occurred on the lightly thinned plot, number 106. The results of this and similar studies seem to indicate that light, frequent thinning is best for pole-sized western white pine.

Plot 151 also was remeasured in early August. This is a growth and yield plot located in the western white pine type on the experimental forest.

The prolific white pine seed tree at area 63 produced approximately 96 cones in 1959. Forty cones per white pine is considered a good crop and 100 cones per tree is quite unusual. This tree has produced an average of 324 cones a year during the period 1935-1950.

During the middle of August the lodgepole pine-jackpine hybrid plots were remeasured. The guidebook reports that "the purposes of this experiment are to observe the qualities of the hybrid and to determine its suitability for growth in the northern Rocky Mountains and Inland Empire."

Lodgepole pine resin was collected through the summer for analysis by Nicholas T. Mirov of the Pacific Southwest Station. Resin was collected from trees located near the ponderosa pine racial variation plots.

Approximately 484 white pine seedlings were planted in May by Dick Bingham, Vin Hoeman, Ed Wicker, and myself at the Priest River vigor-quality outplanting site. The seedlings were planted in plot number 212, blocks A, B, and C.

A sound road system is a prerequisite to the successful management of our timber crop. And a good road network is just as important to productive forest management research work. The 2.6-mile M-2 contour road was constructed this past summer, linking the Center Ridge road with the South Ridge road. A breakdown of construction costs for this road follows:

Clearing	$1,596.32
Drainage	1,312.48
Excavation	12,332.74
	$15,241.54

Cost per mile: $5,862.13

The Hedlund Mills, Inc. purchased the decked sawlogs along the M-2 road. Hedlund bid $4,500.00 for the sawlogs, with the appraised value set at $2,917.50. The Falls Ranger District scaled the logs and handled the administration of the sale. Species and board foot volumes of this sale were:

Western white pine	30 M
Ponderosa pine	17 M
Larch & Douglas-fir	76 M
Cedar	26 M
Hemlock & Grand fir	41 M

FOREST DISEASE RESEARCH. Actidione, an antibiotic recently developed for the control of white pine blister rust, was put into operational use during the summer of 1959. On August 17, a blister rust control crew stationed at Fox Creek sprayed designated areas on the experimental forest with an actidione solution. A small sapling area was treated across the road in front of residence #4. In this area the trees were marked with orange flagging for actidione treatment, and some trees were left untreated to serve as a check. Trees also were sprayed on either side of the road just to the west of residence #4. The third area sprayed was that portion of the forest that lies between plot 193 (lodgepole x jackpine plot) and the vigor-quality white pine outplanting. The area is bounded on the other two sides by the South Ridge road on the east and mature timber to the west. Approximately 4000 to 5000 white pine trees were treated at this third site.

Investigative projects concerned with pole blight of western white pine were continued on the experimental forest. The moisture stress plots located in pole-sized white pine near station headquarters were maintained during the field season. The seedling moisture stress study west of the station grounds was followed throughout the summer. This project is scheduled for excavation and analysis in 1960. Ed F. Wicker was permanently stationed at Priest River from January to September. His primary project was the measurement of white pine increment cores. Growth will be analyzed in relation to pole blight and climate.

A survey was conducted on the experimental forest to determine the distribution and degree of infection of dwarfmistletoe.

Visitors to the forest during the summer of 1959 occasionally "were stopped in their tracks" by peculiar airborne objects that hovered above the office. The individuals were quickly informed that these were not outer space vehicles, but tethered balloons that were a part of the wiresonde equipment used by Merle Lloyd in obtaining air soundings Other instruments utilized in this study to determine the effect of micro-climate on blister rust spore dispersion were hygrothermographs, a three-pen thermograph, and dew recording gages. The main objective of this project was to study the movement of air in mountainous terrain. Work will be continued on this program during 1960 at Priest River.

FOREST FIRE RESEARCH. Forest fire research at Priest River has had an historic background. The first organized fire research program in the history of the Forest Service originated at the Priest River Experimental Forest in 1922. The year 1922 also marked the establishment at Priest River of the first fire danger station in the United States. There have been other noteworthy achievements since these pioneering efforts--the erection of a 150-foot steel weather tower--the study of fire weather variance by altitude and aspect--a preliminary study investigating the possibility of lightning reduction through cloud modification. These are only a few of the many forest fire research projects that have been conducted at Priest River.

Two research projects, the logging slash flammability plots and the large log study, have been maintained for several years and are now nearing completion. The slash plots are scheduled for burning during August of 1960. This burning, carried out under prescribed conditions, will conclude a nine-year study that was designed to determine the effect of species, age, and concentration of logging slash on slash flammability.

Once again the fire assistants at Priest River were cranking up the large logs on the chain hoist and collecting moisture content data. Although this study is earmarked for conclusion and final analysis in 1960, much valuable information has already been obtained from these 36 cedar logs. Seasonal trend lines of moisture fluctuations in these logs followed very closely the buildup and decline of fire danger factors throughout the actual fire seasons. The large logs then provided a reliable basis for preparing the buildup factor that was incorporated into the Model 8 Burning Index Meter. This buildup factor is called the Severity Index in the Intermountain system. Two other fire danger rating systems have also used the large log data in developing their buildup indexes.

Four supplemental large log plots were established in the fall of 1958, and moisture content data were collected from these plots in 1959. One set of plots was located on north and south slopes near Gisborne lookout. The other two plots were situated on north and south slopes in the thermal belt. One plot was located on the north-facing slope of the transect and the second plot of this set was established on the south-facing slope of the South Ridge. These plots were installed to complement the existing large log study in the valley bottom.

The fuel stick moisture studies conducted at the clearcut flammability station included:

1. A study of quality control of fuel sticks.
2. A study investigating the influence of varying degrees of solar radiation on fuel stick moisture content.
3. A study to determine the effect of weathering on weight loss in fuel sticks.

Daily fire-weather observations were taken at the experimental forest from May 1 to October 31. This fire-weather station furnishes the Falls Ranger District with burning index data during the regular fire season. Despite a 35-day drought (no measurable precipitation during this period) in July and August, the overall fire season in the Priest River area was a relatively easy one. The June-September fire season was rated at 80 percent of normal, based on cumulative severity index data (fig. 2). During the July 8-August 11 drought the slope of the cumulative severity index curve steepened considerably, and the forests were in a highly flammable condition at this time. However, lightning occurrence on the Kaniksu National Forest in 1959 was at a minimum, and this potentially critical period in July and early August passed without any serious damage to forest resources. The fire season tapered off sharply in late August and dwindled to nothing in September, when precipitation was 242 percent of normal.

FOREST INFLUENCES. Weather records have always been considered of paramount importance at Priest River, and justly so, for they are of significant value to all phases of forest research. Daily weather observations at the control station, fire-weather measurement from May through October, measurement of high-elevation and low-elevation snow courses, precipitation records from recording rain gages, streamflow data from Benton Creek gaging dam, soil moisture data--all of these observations were maintained at the experimental forest. This section of the annual report will discuss only the current weather recording developments at Priest River.

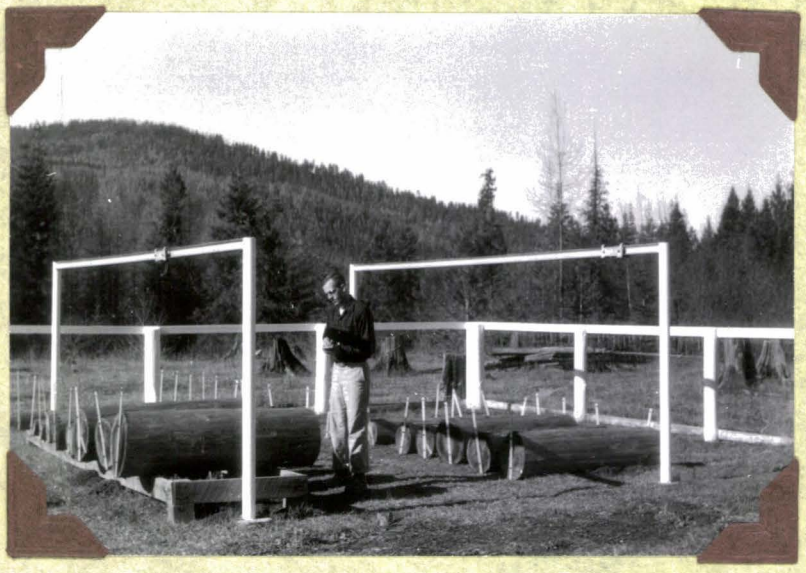
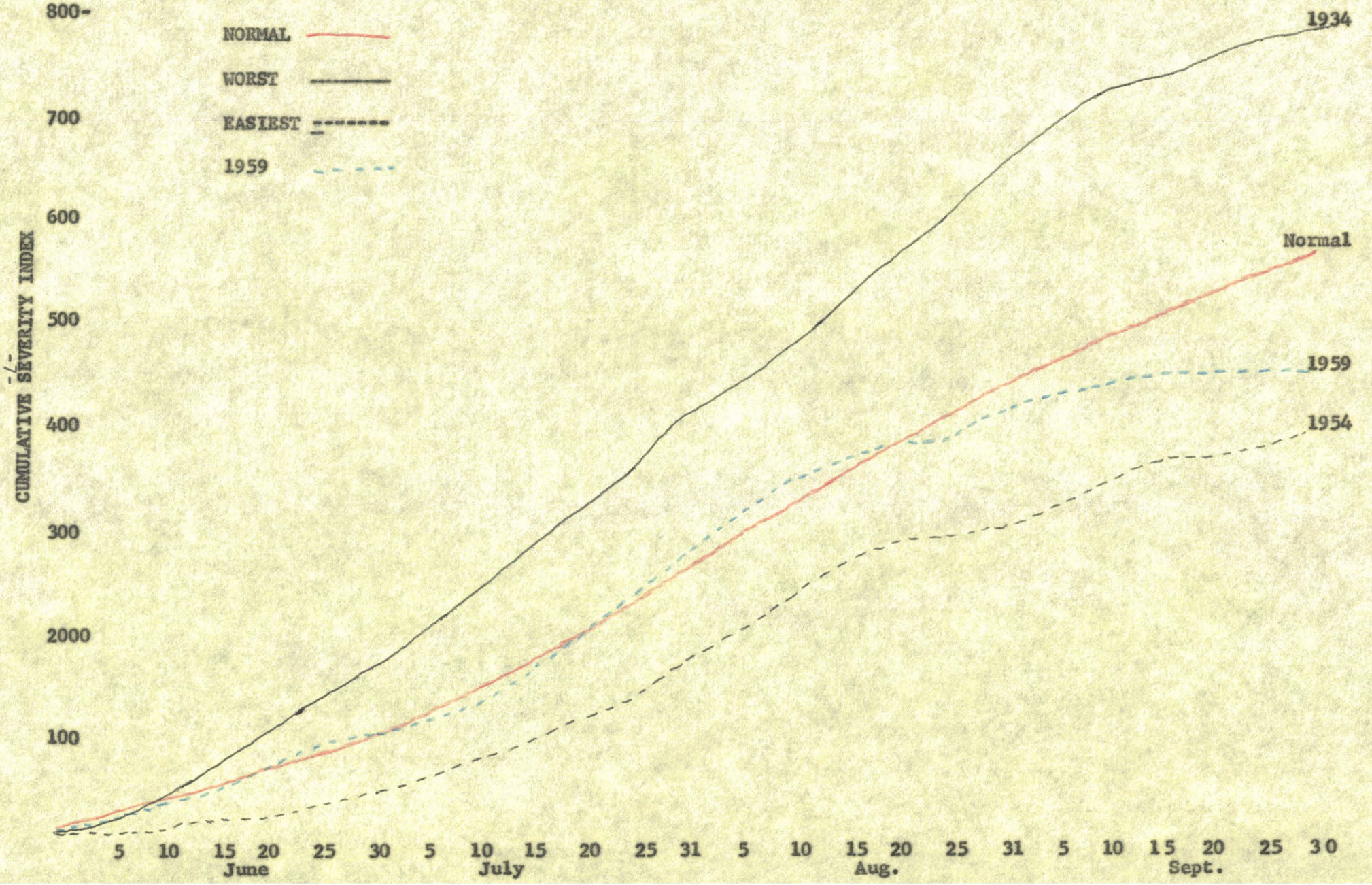


Figure 1.--Superintendent Mutch recording large log data at Clearcut Flammability Station.

Figure 2.--Forest fire seasonal severity, Priest River Experimental Forest



The weather summary for 1959 (table 1) was prepared from the daily observations at the control weather station. This continues an unbroken string of measurements since May, 1914. From the fall of 1911 to May, 1914, the weather station was situated 1400 feet west of its present location. In November of this year the U. S. Weather Bureau presented an institutional award to the Forest Service "in grateful recognition of 25 years of cooperative weather observations at Priest River Experimental Station."

On July 10, Art Brackebusch of the Division of Fire Research, Merle Lloyd of the Division of Forest Disease Research, Bob Callaham, Leader of the Spokane Research Center, and I met at the experimental forest to discuss the Priest River weather records. Every record that is taken on the forest was subjected to a thorough review. An itemized account was developed of the kind of information being taken on each instrument, the duration of the record, and its accuracy. The following recommendations evolved from this discussion:

1. The tipping bucket at the control station duplicates the recording rain gage, and the record is more difficult to interpret. The instrument should be removed and the record discontinued.

2. The sunshine recorder at the top of the tower and the continuous barograph record in the office have performed erratically and are of little value. The instruments should be removed and the record discontinued.

3. A new installation was proposed for the Benton Spring snow course site. It was decided that a recording rain gage and storage gage should be installed to measure precipitation where we are now recording springflow, snow depth, and soil moisture. The rain gages would provide records similar to those obtained at the control station, Benton Creek Dam, and end of the Benton Creek road. Thus we would have four continuous records of precipitation from the bottom to the top of the valley.

During the fall, a storage rain gage was installed near sampling point two on the Benton Spring snow course. An eight-inch storage collector was mounted on a 10-foot steel tower provided by the Weather Bureau. This installation includes an alter flexible wind shield to control air currents which might deflect falling snow away from the opening. During the snow-free months a recording rain gage will replace the storage gage at this site.

Table 1.--1959 Weather summary, Priest River Experimental Forest

Month	Precipitation		Temperature			
	Normal	1959	Normal Ave. max.	1959 Ave. max.	Normal Ave. min.	1959 Ave. min.
	Inches		°F.			
Jan	3.88	7.27	30.5	32.9	16.9	18.7
Feb	2.88	2.57	36.4	35.4	17.5	19.4
Mar	2.67	2.18	46.3	45.0	23.9	25.3
Apr	2.04	1.99	58.0	57.1	29.5	30.8
May	2.16	3.98	66.9	61.0	36.0	34.6
Jun	2.39	1.93	74.3	73.0	42.0	43.7
Jul	.93	.21	83.6	84.0	45.0	44.9
Aug	.97	1.16	82.0	75.6	43.1	42.7
Sep	1.67	4.04	70.4	63.4	37.4	41.4
Oct	2.94	2.77	56.4	53.4	31.6	33.9
Nov	3.63	7.79*	39.9	36.5	26.4	18.6**
Dec	4.25	3.26	32.3	32.3	20.6	23.3
Annual	30.41	39.15	56.4	54.1	30.8	31.4

* Total precipitation for November, 1959, surpasses previous record of 7.69 inches, November, 1937.

** Lowest average minimum temperature for November; surpasses previous record of 18.7 degrees, November, 1955.

Surveys of snow on the Benton Meadow and Benton Spring snow courses and the collection of soil moisture data were conducted in cooperation with the Soil Conservation Service. Snow course measurements are normally taken at the beginning of each month from January through May. This year, however, the Soil Conservation Service requested that measurements be taken on the Benton Meadow snow course starting on November 1 (table 2).

ADMINISTRATIVE ACTIVITIES

Maintenance and Improvements. The usual maintenance projects were conducted during 1959, and these various tasks will not be enumerated here. However, some improvements were achieved which should receive special consideration. A water contamination problem has existed at the forest for many years. A chlorination unit and holding tank were installed in residence #4 in the fall of 1959. Chlorination units will be placed in the cookhouse, lodge, and residences #2 and #3 in 1960. These chlorinators will eliminate the contamination problem and will provide safe drinking water.

Recurring sewer line difficulties at residence #4 were remedied in October. A 500-gallon concrete septic tank was installed across the road from the superintendent's residence. Six-hundred feet of Orangeburg pipe was laid in this new sewer system, connecting the house, new septic tank, and the roadside septic tank in the meadow. The location of the septic tank and course of the sewer line were marked with stakes for future reference.

Sally Mutch entered into the maintenance program, repainting and redecorating the office and kitchen in residence #4. The shake roof of this residence was stained green by the handyman.

COOPERATION. Kaniksu National Forest personnel have always been ready to lend a hand, and their interest in the experimental forest is appreciated. During 1959, national forest crews assisted in snow removal, plumbing problems, and the spraying of the slash plots with Dalapon. The main roads on the forest were graded by the Falls Ranger District. A crew from Falls also restored the phone line to Gisborne in June. The U. S. Weather Bureau cooperated in the installation of the storage rain gage on the Benton Spring snow course. The Weather Bureau placed a 10-foot steel rain gage tower on loan to the experimental forest.

Table 2.--Snow depth and water content, 1959, Priest River Experimental Forest

	Benton Meadow course		Benton Spring course	
	Depth	Water content	Depth	Water content
		Inches		
Jan	13	4	35	9
Feb	20	7	52	14
Mar	30	10	63	20
Apr	12	5	66	20
May	Bare of snow		29	11
Nov 1	" " "			
Nov 16	Trace of snow			
Dec 5	8	1		
Dec 16	8	2		

INSPECTIONS. Three Forest Service inspections were conducted on the experimental forest:

1. Fire-weather station inspection, June 3
   Bill Krumm, USWB, Missoula
   Ross Crowley, SO, Sandpoint

2. General Functional Inspection-Fire Research, July 18

A. A. Brown	Director, Div. of Fire Res., WO
Jack Barrows	Chief, Div. Fire Research, Missouls
Chuck Wellner	Chief, Forest Mgmnt. Research, Ogden
Bob Callaham	Research Center Leader, Spokane
Jack Dieterich	Project Leader, FFR, Missoula
Mike Hardy	Project Leader, FFR, Missoula
Chuck Kaehn	Project Leader, FFR, Missoula

3. General Functional Inspection, October 1-2

Ed Crafts	Asst. Chief, WO
Reed Bailey	Director, INT, Ogden
Chuck Wellner	Chief, Forest Mgmnt. Research, Ogden
Jack Barrows	Chief, Div. Fire Research, Missoula
Bob Callaham	Research Center Leader, Spokane
Paul Packer	Project Leader, Div. WMR, Missoula
George Weyermann	Supervisor, St. Joe Nat'l Forest
Ed Barry	Asst. Regional Forester, Missoula
Don Leaphart	Project Leader, Div. FDR, Spokane

Figure 3.--Land ownership discussion during Ed Craft's fall visit to Priest River. Heads fully visible left to right--Bailey, Barry, Crafts, Wellner, Leaphart.

PERSONNEL AND MEETINGS. Three superintendents were in residence on the experimental forest in 1959. When I went on military leave in November, 1958, Walt Mueggler moved out to Priest River from Spokane to serve as acting superintendent. Walt left for Duke University in late January and was replaced by Ed Wicker. Ed assumed charge of the experimental forest until my return in early May. Ed Wicker and his family remained in residence on the experimental forest until September.

The remainder of the field season staff at the experimental forest consisted of Milo Coons, Ron Babich, and Dave Norris. Milo Coons was hired as the new caretaker on June 1, 1959. Milo took a personal interest in the overall station appearance and carried out his duties very satisfactorily throughout the summer. The active fire research program presented a challenge to the two fire assistants, Ron Babich and Dave Norris, and they met this challenge with continual interest and enthusiasm in their jobs. The boys even added an innovation of their own to one of the studies, awaking at two-hour intervals one night to obtain a continuous record of fuel stick and large log moisture content variations. Vivian Roberson prepared meals for the several meetings that were held on the forest, and very ably satisfied the appetites of hungry foresters and visitors.

Many individuals conducted project work on the experimental forest during 1959. Merle Lloyd and Don Leaphart had forest disease studies based at Priest River that required their supervision and direction from time to time. Art Brackebusch made several trips to the forest to discuss the progress of the fire research program with the fire assistants. Ray Boyd and Al Stage arrived at the forest in early August with their field assistants to remeasure forest management plots. Ray Abbott, a forest management research field assistant from Missoula remeasured the lodgepole pine-jackpine hybrid plots in August. Jim Hanover and his family resided at the forest in September while Jim was laying out a seed orchard in Sandpoint. The Priest River filing system was subjected to a much needed reorganization in October by Vandella Gordon and Betty Guillot. Otis Copeland and Jim Kimmey visited the forest during the field season to view several research projects.

The following meetings and field trips took place on the experimental forest: Ecology field trip conducted by Dr. Daubenmire, Dept. of Botany, Washington State University, May 23-24

Dendrology study and quiz, Priest River 4-H group, Aug. 25

Inland Empire Forest Advisory Council Meeting, Sept. 11

Show-me trip for Senator Dworshak, Idaho, and Roscoe Rich, Southern Idaho stockman, Oct. 6

HIGHLIGHTS OF 1958 AT THE PRIEST RIVER EXPERIMENTAL FOREST

A change in administration took place at Priest River during the summer of 1958. Jim Hanover was promoted from superintendent of the experimental forest to a position with the Northern Idaho Forest Genetics Center in Moscow. Upon completion of graduate studies at Montana State University in Missoula, Bob Mutch moved to Priest River in mid-August as Jim Hanover's successor.

The experimental forest was the scene of considerable construction activity in 1958. Forest Service crews erected a new lookout tower, complete with tile floor and built-in cupboards and bunk, on Gisborne Mountain. This tower replaced the old structure which went up in 1933. The Forest Service road crew constructed the N-5 and N-7 contour roads during the summer months. Rock outcroppings prevented the mid-section of the N-7 road from being completed. The flagpole in front of the office was replaced with a 50-foot white pine pole.

Several purchases were made in 1958 that have facilitated the operation of the experimental forest. The addition of a new chain saw and gasoline powered rotary lawn mower has aided significantly in lightening the work load at the forest. A chest style deepfreeze was acquired for the cookhouse.

The large logs at the clearcut and full timber flammability stations were replaced in the spring of 1958 with sound logs.

Visitors to the forest in 1958 included Jack Dieterich, Jack Barrows, Mike Hardy, Dr. Vincent J. Schaefer, Ken Keeney, Ed Barry, John Milodragovich, Phil Johnson, Dave Olson, Dr. Daubenmire, D. E. Parker, C. M. Countryman, John Keetch, Kenneth Sargent of Nairobi, Kenya, East Africa, Thatcher Allred, and Dr. Wendell Keck.

Dr. Frank Craighead and Mike Gaufin from the Washington Office visited the forest on a recreation inspection in 1958. Burt Lexon of the Washington Office and Chuck Wellner arrived at the forest in July on a General Functional Inspection of forest management research.

Table 3.--Snow depth and water content, 1958, Priest River Experimental Forest

	Benton Meadow course		Benton Spring course	
	Depth	Water content	Depth	Water content
		Inches		
Jan	12.9	2.3	36.9	10.1
Feb	17.1	5.1	53.2	14.9
Mar	8.4	3.0	49.6	17.5
Apr	Bare of snow		48.1	18.2
May	" " "		45.8	19.3

Table 4.--1958 Weather summary, Priest River Experimental Forest.

Month	Precipitation		Temperature			
	Normal	1958	Normal Ave. max.	1958 Ave. max.	Normal Ave. min	1958 Ave. min.
	Inches		°F			
Jan	3.88	4.71	30.5	33.9	16.9	25.6 1/
Feb	2.88	5.57	36.4	42.0	17.5	29.0 1/
Mar	2.67	2.29	46.3	44.4	23.9	24.2
Apr	2.04	3.82	58.0	54.9	29.5	31.2
May	2.16	.61 2/	66.9	77.5 3/	36.0	41.1
Jun	2.39	4.13	74.3	77.7	42.0	47.8
Jul	.93	.70	83.6	87.5	45.0	47.8
Aug	.97	.90	82.0	88.3 4/	43.1	46.8
Sep	1.67	1.36	70.4	70.6	37.4	38.5
Oct	2.94	1.95	56.4	60.5	31.6	30.6
Nov	3.63	5.47	39.9	38.4	26.4	24.4
Dec	4.25	4.10	32.3	34.2	20.6	25.5
Annual	30.41	35.61	56.4	59.2	30.8	34.4

1/ Highest average minimum temperature on record for February
2/ Lowest precipitation total on record for May
3/ Highest average maximum temperature on record for May
4/ Highest average maximum temperature on record for August